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Investigation of some trace elements in Raipur Industrial area and its surrounding, Raipur District.

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Abstract
The paper deals with determination of eight trace metals namely. Copper, Iron, Mangnese, Zinc, Nickel,, Chromium Lead and Mercury in the ground water of different sites of Raipur Industrial area of Raipur district . All activities carried out on the ground surface have direct or indirect impact on the ground water whether associated with urban ,industrial or agricultural activities large scale concentrated source of pollutants, such as industrial discharges and sub surface injection of chemicals and hazardous are obvious source of ground water pollutants. This study was carryout in the month of during summer 2013. The samples were collected from seven different source of Raipur Industrial area of Raipur. The results obtained are compared with safe limits in ppm for heavy metals laid down by BIS, WHO, ICMR, APHA.

Keywords: Concentrated, pollutant, Industrial area, traces metals.

INTRODUCTION

Water is one of the very precious substances on the earth, it is very essential for the existence and survival of the life. As population grows in their need for water increases the pressure, the pressure on our ground water resources also increases. In many areas of the world, ground water is now being over extracted, in some places massively. So, the result is falling wafer levels and declining well yield, land subsidence and ecological damage, such as the drying out of wetland.

The trace metal in water behaves in a typical manner. No single mechanism is sufficient to explain the process that are undergoing in the water. Trace metals like Fe, Mn, Cu, Zn, Co, Ni,etc., are very important for the proper functionary of the biological system and their deficiency or excess in the human system can lead number of disorders Other trace metals like Pb, As, Hg, etc., are not only biologically non essential but definitely toxic . The potential toxic metal elements, such as Cr, Pb, Cu, Zn, etc., are identified to cause health hazards in animal. In case of many heavy metals, bio-magnification occurs through food chain. So, it is necessary to discuss the theoretical aspects of trace metals for easy understanding of their metabolic activities.

Cu and Fe is mixed in groundwater by rocks bearing iron and copper bearing ores, namely cuprites, malachite, azurites, hematite, magnetite and iron pyrite. Fe in surface water is generally present in the ferric state. Concentrations of Fe greater than 1 mg/L have been reported to occur in ground water.

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MATERIALS AND METHODS

Selected sites

Nine water samples were collected from Raipur district in different sites in polyethylene containers which were thoroughly cleaned with 1:1 HNO3 rinsed several times with distilled water and dried in electric oven.

RESULTS AND DISCUSSION

Discussion of result

The occurrence of trace elements in natural and ground water is affected both by hydro chemical factors, like mineral composition of the rocks, soil characteristics, etc., as well as by anthropogenic activities and likely to show both temporal and spatial variation.

Copper: According to limits prescribed by various authorities (WHO, ICMR, APHA, BIS) it was found that all the samples collected from the sources were free from copper, the average value of copper in all water samples are much below the permissible limits but copper is excess in S6 sample.

Iron: According to BIS and ICMR the maximum allowable concentration and the permissible concentration in drinking water in 1.0 ppm and 0.3 ppm, respectively. It is content of hemoglobin, so it is very necessary for all living organism but in excess promote iron bacteria in water. Iron is excess in S5, S7, Samples of Raipur surroundings, Raipur district.

Table 1. Safe limits (as per APHA, WHO, BIS, ICMR) and maximum acceptable limits for drinking purpose use of ground water adverse effect on bodies

Serial No	Heavy metal in Ground water	Max	Effect
01	LEAD	0.05	gastro intestinal track ,Toxic plumb solvency diseases, visual disturbance anemia, etc.,
02	CHROMIUM	0.05	Carcinogic acuity (cancer) can produce coetaneous and nasal mucous membrane ulcer and dermatitis. hexavalent Cr causes lung tumors.
03	COPPER	1.5	essential elements for metabolism, deficiency results is anemia in infants, excess may results in liver damage
04	NICKEL	0.02	May be carcinogenic, can react with DNA. Resulting in DNA damage
05	MERCURY	0.001	Causes minimata disease also causes blue baby disease in infants the colour of skin in baby is turn . Blue. Paralysis
06	IRON	1.0	Promote iron bacteria in water, bad taste, In trace is nutritional
07	MANGANESE	0.5	Produce bad taste, Excess causes reduced metabolism of iron to form hemoglobin
08	ZINC	5	Causes astringent taste and opalescence in water

Table 2. Sampling station in Raipur industrial area

Sampling place	Sampling point number
Real ispat	1
Seeta sponge	2
Bajrang Alloys	3
Shivalic sponge	4
Common drain -Nala	5
Chhokra nala industry	6
Kharun river up strem	7
Kharun river mid stream	8
Kharun river down stream	9

Table 3. Concentration of heavy and trace metals in Raipur district.

Trace metal	1	2	3	4	5	6	7	8	9
Lead	0.19	0.10	0.18	0.14	0.16	1.18	0.18	0.2	0.25
Cadmium	1.20	0.20	0.50	0.40	0.90	0.50	0.01	0.04	0.08
Chromium	0.02	0.012	0.014	0.10	0.09	0.06	0.024	0.028	0.08
Copper	5.0	2.02	3.10	1.20	6.02	4.20	8.051	10.52	20.56
Zinc	10.10	5.50	2.20	1.00	3.0	4.0	9.14	10.25	25.26
Iron	2.00	3.10	2.10	15.0	17.0	16.0	16.35	18.41	21.33
Manganese	22.0	5.02	2.10	2.10	5.0	4.0	1.02	22.1	23.16
Mercury	0.01	0.01	0.02	0.01	0.01	0.01	0.02	1.2	1.49

Manganese: The maximum allowable concentration and permissible concentration of Mn in drinking water is 0.5 ppm and 0.05ppm, respectively according to WHO, BIS and ICMR (Satyanarayana and Shastri, 1983). Most of the water samples analyses had less than 100 ppb (0.1 ppm).

Zinc: Zinc is an essential plant and human nutrient. The maximum allowable concentration and permissible concentration of zinc in drinking water are 15 ppm and 5 ppm, respectively. According to WHO, ICMR, APHA the average value of zinc in all the water samples are below the permissible limit. The concentration of zinc in all water samples is below 1000 ppb (1 ppm). Hence all the samples collected from all sources are below from maximum permissible limit for Zinc.

Nickel: The permissible concentration of nickel in groundwater is 0.02 ppm. Remaining samples are within the permissible limit. S5, S6, samples are out of the limit.

Chromium: The maximum permissible limit of chromium in drinking water according to WHO and ICMR is 0.05 ppm. Small amount of chromium is essential to mammals but in excess it produces harmful effects. The obtained data shows that chromium content in water is within limits prescribed by the various authorities except slightly higher in S4, S5, S7 in Raipur district.

Lead: It is very toxic element, which accumulates in the skeletal structure of man and animal. The maximum permissible concentration of lead in drinking water is 0.05 ppm. According to WHO and ICMR almost all the water samples had less than50 ppb of lead.

CONCLUSION

Systemic study of the chemical data obtained as results of analysis of ground water samples from Raipur dist and Andhra Pradesh are affected by one or more of nine studied trace metals. At

least 60% of the population is still dependent on ground water sources for drinking purpose, especially in outer city and distant villages. According to the analysis of some water samples of Raipur district of CG, the manganese, lead and zinc are not found beyond limit, while copper, iron and chromium are found towards little higher sides on some places and nickel is found higher only in some areas of Raipur surroundings ,but these metals are essentials for our body metabolism. They play role of co-factor in activity of enzyme. Thus to keep ground water free from Cr, Fe, Mn, Pb, etc., and other ions the following recommendation should be taken in to account.

1. Chromium enriched refuge should be properly treated and then disposed off. Construction of ground water structure on dumping sites or its immediate vicinity should be avoided as Cr pollution relates to point source.
2. Industries should be set up their effluents treatment plants (ETP) independent or jointly as per norms and should remain effectively operational in order to safe guard the ground water for future generation.
3. In agricultural excessive use of nitrogenous and phosphates fertilizers should be avoided so that it does not leach down to ground water and deteriorates its quality.
4. Mass awareness should be generated about the over use of pesticides, its harmful effects on quality of water and human health.

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